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**Inoue et al.**

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(54) **LIQUID DISCHARGE HEAD AND LIQUID DISCHARGE APPARATUS USING THE SAME**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,636,814 A 1/1987 Terasawa  
5,162,817 A 11/1992 Tajika et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN 203358051 U 12/2013  
WO 2012/121693 A1 9/2012

OTHER PUBLICATIONS

Chinese Office Action dated Jun. 6, 2016, in Chinese Patent Application No. 201510290322.9.

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(57) **ABSTRACT**

A liquid discharge head including a liquid storage chamber capable of holding a liquid, a liquid communication pipe communicating with the liquid storage chamber and being configured to supply the liquid from a liquid tank to the liquid storage chamber by installing the liquid tank to the pipe to communicate with the liquid tank, a discharge port communicating with the liquid storage chamber to discharge the liquid, an electrode pair each having an outside end portion located outside the liquid storage chamber and detecting a liquid level of the liquid storage chamber, and an electric contact portion connected to the outside end portion of each of the electrode pair. The electric contact portion is located above the liquid communication pipe with a discharge port surface on which the discharge port opens taking a position facing perpendicularly downward.

**18 Claims, 9 Drawing Sheets**

